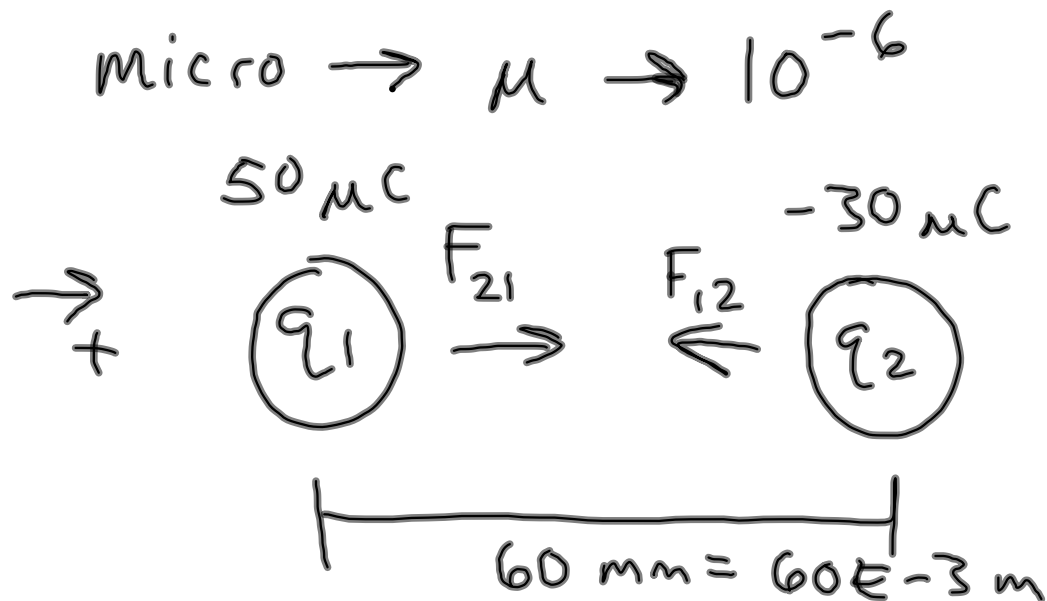


Practice Problems and Circuit Notes 5.8.12 CP Physics

Two charged particles are brought near to each other. Charge 1 has a value of 50 microC (50E-6 C), charge 2 has a value of -30 microC (30E-6), and they are separated by 60 mm. What is the force that each exerts on the other?



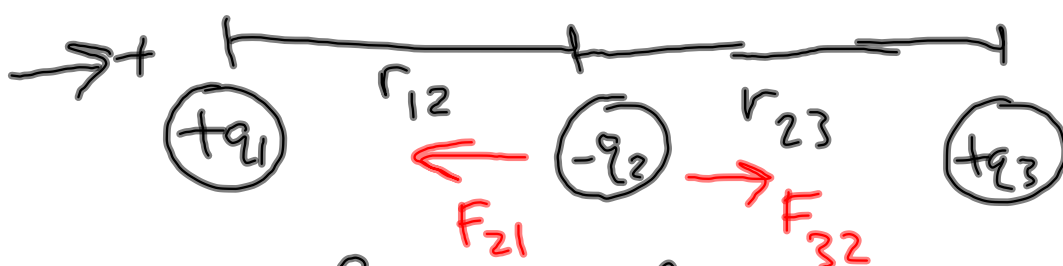
this is an attractive force because
+ and -

units:
N
m
C

$$F_{21} = \frac{k |q_1| |q_2|}{r^2}$$

$$= \frac{(8.99 \times 10^9 \text{ N}\cdot\text{m}^2/\text{C}^2)(50 \times 10^{-6} \text{ C})(30 \times 10^{-6} \text{ C})}{(60 \times 10^{-3} \text{ m})^2}$$

$$= 3745 \text{ N}$$



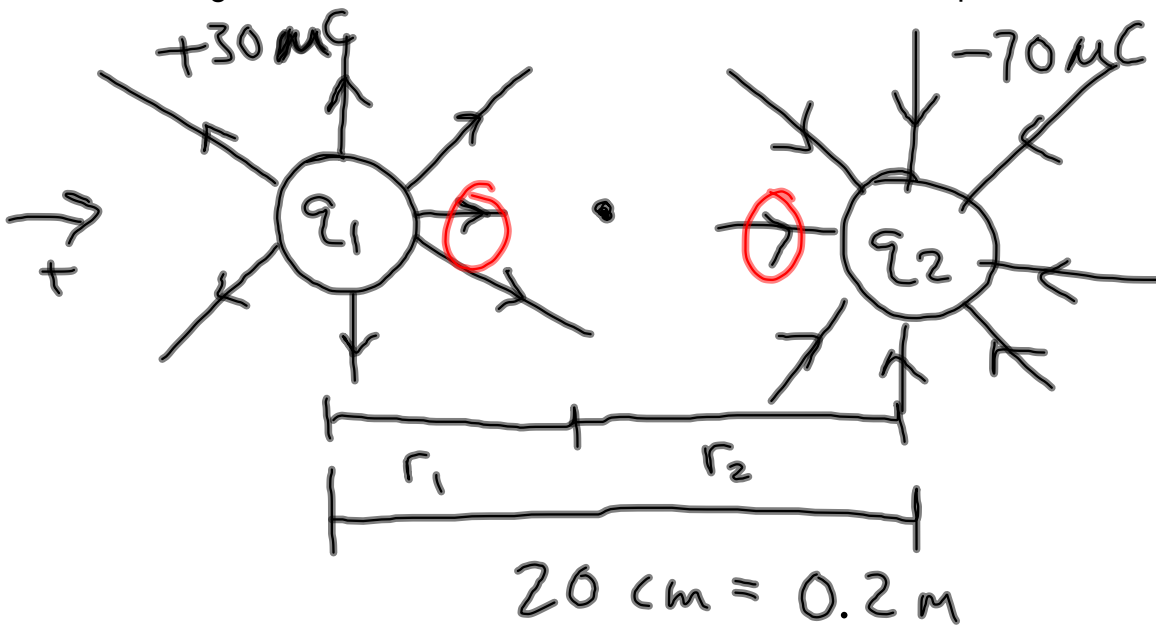
find net force on q_2

$$\Sigma \vec{F} = \vec{F}_{21} + \vec{F}_{32}$$

$$= \frac{-k|q_1||q_2|}{r_{12}^2} + \frac{k|q_2||q_3|}{r_{23}^2}$$

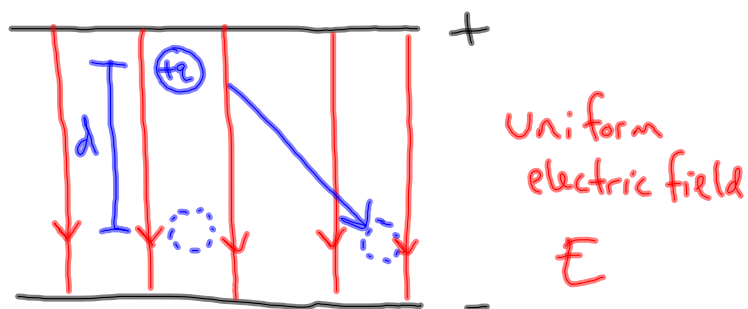
Practice Problems and Circuit Notes 5.8.12 CP Physics

Two charges are separated by a distance of 20 cm, and there is a point halfway between them at which we want to measure the electric field. If one charge is +30 microC and the other charge is -70 microC, what is the net electric field at the point?



$$\begin{aligned}\Sigma \vec{E} &= \vec{E}_1 + \vec{E}_2 \\ \text{net electric field} &= \frac{k|q_1|}{r_1^2} + \frac{k|q_2|}{r_2^2} \\ &= \frac{+k(30 \times 10^{-6} \text{ C})}{(.10 \text{ m})^2} + \frac{k(70 \times 10^{-6} \text{ C})}{(.10 \text{ m})^2} \\ &= 8.99 \times 10^7 \text{ N/C}\end{aligned}$$

- Electric Potential Energy:



$$\Delta U_e = -q E d$$

change in electric potential energy
 \rightarrow distance
 \rightarrow electric field
 \rightarrow charge

\rightarrow Only direction that changes the electric potential energy is in the same direction as the electric field.

- Electric potential difference
 (Potential, Potential difference, Voltage)

$$\Delta V = \frac{\Delta U_e}{q} = \frac{-q E d}{q} = -E d$$

Units: $1 \text{ V} \equiv 1 \text{ J/C}$
 Volts

- Current:

- flow of e^-

- $I = \frac{\Delta q}{\Delta t}$
 - \rightarrow change in charge
 - \rightarrow change in time

\rightarrow current

- Unit of current is an Ampere

$$1 \text{ A} \equiv 1 \frac{\text{C}}{\text{s}}$$

- Resistance:

- Amount that a material impedes the flow of e^-

- Measured in Ohms (Ω).

- Circuits:

- Common pieces:

Wire 

Battery 

Resistor 

- Schematic is a drawing that represents a physical connection.

